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A Randomized Controlled Trial to Evaluate Interventions Designed to Improve University
Students' Subjective Financial Wellness in the United Kingdom

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Abstract

The current paper describes a randomized controlled trial to evaluate the effectiveness of intervention tools designed to help people save more or spend less money by enhancing their capabilities, motivations, and opportunities. The participants included 177 students from an English University who were randomly allocated to either the Control, Savings-Tool, or Savings+Habit-Tools group. Participants provided with the intervention tool(s) for four weeks were more likely to experience improvements in both their financial satisfaction and subjective perceptions than those in the Control group not asked to use either tool. The tools did not significantly affect financial behaviors or objective financial wellness. The discussion examines limitations of the study and discusses avenues for future research such as including a longer follow-up period.

Keywords: behavior change, financial counselling, financial wellbeing, financial wellness

A Randomized Controlled Trial to Evaluate Interventions Designed to Improve University Students' Subjective Financial Wellness in England

Introduction

Approximately 78% of university students in the United Kingdom (UK) rely on loans to make ends meet, not simply to cover tuition, and just around half understand the terms of their repayments (Save the Student, 2018). Universities could offer more comprehensive financial counselling to improve students' current and future wellbeing (Choi, Gudmunson, Griesdorn, & Hong, 2016). Previous studies have already linked students' financial difficulties to various elements of their wellbeing, including their mental health (Richardson, Elliott, & Roberts, 2015; Richardson, Elliott, Roberts, & Jansen, 2016), drug use (Berg, et al., 2010), and anxiety about future debt (Cooke, Barkham, Audin, Bradely, & Davy, 2004). Further research suggests that people's financial stress may negatively impact their physical health (Benson-Eggleton, 2008). Netemeyer, Warmath, Fernandes, and Lynch (2017) find that people's financial stress and expectations may explain a greater proportion of their overall wellbeing than their job satisfaction, relationship satisfaction, or physical health. Taken together, this past research suggests that promoting financial wellness may promote student success. The current study evaluates interventions to improve university students' financial wellness in England.

Background and Study Objectives

The current paper uses the term 'financial wellness' as opposed to 'financial wellbeing' or 'economic wellbeing,' because 'financial wellness' has a narrower use in the literature (Gerrans, Speelman, & Campitelli, 2013). The financial wellness taxonomy is depicted in the first two rows of Figure 1. The financial wellness taxonomy includes the following four components: (1) financial satisfaction, e.g. people's beliefs that they can

achieve their financial goals; (2) financial behaviors, e.g. people's tendency to check their account balances; (3) subjective perceptions, e.g. people's attitudes toward saving money; and (4) objective financial wellness, e.g. people's monetary wealth (Joo, 2008). These four components are positively related, and researchers generally agree that interventions designed to increase one component may positively influence other components (Sabri & Falahati, 2012). Joo and Grable (2004) found a significant link between people's financial behaviors and their satisfaction, e.g. people who put money aside for retirement tend to have higher financial satisfaction. In addition, Robb and Woodyard (2011) found that people with higher financial satisfaction and confidence are more likely to engage in positive financial behaviors, e.g. saving money for an emergency or retirement.

As financial wellness includes four components, it is not easy to assess with a single measure. The third row of Figure 1 describes how each component of financial wellness is assessed in the current study. Students' financial satisfaction, behaviors, and subjective perceptions are assessed using self-reported items from Money Advice Service's Financial Capabilities Survey (2015). Money Advice Service was set up in the UK to understand and improve people's ability to manage money. Its launch in 2011 coincided with an increase in university tuition fees in England and Wales, from approximately £3,000 to £9,000 a year (Bunce, Baird, & Jones, 2017). The current project was funded by Money Advice Service's "What Works Fund," and its use of the Financial Capabilities Survey will allow researchers to compare the present study's findings with future findings as they are released. As the Financial Capabilities Survey lacks a way to index short-term changes in objective financial wellness, in the current study students were simply asked to show a researcher their primary bank account balance at each appointment.

The intervention tools used in the current study were initially developed in a study called "Money Lives" (Ipsos MORI, Elliott, and Vlaev, 2013). Money Lives' researchers

conducted ethnographic interviews with 72 families and in-depth interviews with 48 people to understand their money management. Then they worked with academic researchers to organize their findings according to a theoretically and empirically informed model of behavior change, called the “COM-B model” (Michie, van Stralen, & West, 2011). The COM-B model is the central part of the Behavior Change Wheel framework. The Behavior Change Wheel helps interventionists diagnose why a desired behavior is not occurring and then select appropriate behavior change techniques to overcome the diagnosed problem(s) from an empirically validated list of 93 hierarchically clustered techniques, called the Behavior Change Techniques Taxonomy (Michie, et al., 2013). The COM-B model proposes that people need sufficient Capabilities (knowledge and ability), Opportunities (physical and social resources), and Motivations (contemplative and habitual) to perform a desired behavior, such as saving more money or spending less money. If people are lacking in just one of the components, they will be less likely to perform the desired behavior; therefore, multi-component interventions may be necessary to change some behaviors.

Money Lives found that people’s financial wellness was influenced by all COM-B components, and therefore a multi-faceted approach may be necessary to improve people’s financial wellness at a population and individual level. In addition, this finding may help to explain why educational interventions that focus on changing people’s capabilities to manage money, without supporting their opportunities and motivations, have had limited success. A 2008 literature review conducted by the Federal Reserve Bank of Cleveland found limited support for educational interventions (Hathaway & Khatiwada, 2008). A 2014 literature review conducted by the World Bank also found limited support (Miller, Reichelstein, Salas, & Zia, 2014). Both reviews note that few randomized controlled trials are available and call for more rigorous evaluations to guide public policy. To meet this call, the current study puts

forth a randomized controlled trial to evaluate interventions designed to improve students' financial wellness in England.

The current study's interventions involved helping students to use two tools developed by Money Lives: the savings tool and the habit tool. Both tools take a multi-faceted approach to changing behavior and have the potential to influence all COM-B components. The potential effects of the interventions are illustrated in Figure 1, with arrows from the interventions through the COM-B components and the financial wellness components and ending at the overarching financial wellness construct. Both tools drew from the Social Cognitive Theory (Bandura, 1997) in order to promote feelings of self-efficacy and from the Theory of Planned Behavior (Ajzen, 1991) in order to promote planned money management. Regarding opportunity, both tools prompt people to develop realistic "action plans" to save more or spend less of their available money. How each tool may influence people's capabilities and motivations is described below.

The savings tool addresses Money Lives' finding that many people do not know how to budget their money, i.e. it addresses a capability factor. To help people budget their money, the savings tool asks them to state how much money they typically have available to spend each month and how much money they typically spend each month on common and personal items. Regarding motivation, the savings tool addresses Money Lives' finding that people lack motivation to change their financial situation. To motivate people to start saving, the savings tool asks them to describe a goal item that they hope to purchase in the next 12-months and then to specify how much money towards that goal they plan to save each month. The goal aspect of the savings tool aligns with the idea of SMART goals: goals that are Specific, Measurable, Assignable, Realistic, and Time-bound (Doran, 1981; Locke & Latham, 2006).

The habit tool addresses Money Lives finding that many people had adverse spending habits and so it addresses the capability component. The negative effect of habitual spending is more likely to be felt by impulsive people. Impulsivity is a personality trait that describes a desire to act without conscious thought or reasoning (DeYoung, 2011), e.g. habitually buying candy when checking out at a grocery store. Notably, people with greater levels of impulsivity tend to have greater levels of unsecured debt (Ottaviani & Vandone, 2011) in addition to reduced savings rates (Ersner-Hershfield, Garton, Ballard, Samanez-Larkin, & Knutson, 2009). Impulsivity is often measured using surveys, like the Personal Need for Structure scale (Neuberg & Newsom, 1993). The habit tool provides a constant physical reminder to people that they may, if impulsive, need to change their spending habits. To use the habit tool, people fill out a portable behavioral contract by which they pledge to swap an expensive spending habit for a cheaper one. Regarding motivations, people also self-monitor how often they succeed by writing tallies directly on the habit tool (Day & Schleicher, 2009; Skinner, 1963).

The current study evaluates the effectiveness of the savings tool used alone and the savings tool used in combination with the habit tool. Findings supporting the tools' effectiveness would support the application of theory-informed, multi-component interventions to improve students' financial wellness in England. The study did not aim to test any particular element of the COM-B model. This limitation is explored further in the discussion. The current study builds on the existing literature by testing an intervention theoretically informed by that literature using a randomized controlled trial (Collins, 2017). In addition, it offers a methodology and decision aid tools that can be readily taken up by face-to-face financial counselling services. The objectives of the current study are reviewed below.

The primary objective (Objective 1) was to compare the percentage of students whose financial satisfaction improved in each intervention group to a no-treatment control group. We hypothesized that the percentage of participants whose financial satisfaction improved, would be higher in the intervention groups than in the control group. The following exploratory objectives were designed to assess the remaining financial wellness components. To assess students' financial behaviors (Objective 2), they were asked about their goal-planning and account checking. To assess students' subjective perceptions (Objective 3), they were asked about their attitudes towards several aspects of money management. To assess students' objective financial wellness (Objective 4), they were asked to show their primary bank account balance at each appointment. In addition, students' use of and reactions to the tools were examined (Objective 5).

Methods

The study was approved by the University of Warwick's Humanities and Social Sciences Research Ethics Committee (Reference: 124/16-17). We planned to recruit a sufficient number of students for our primary objective, i.e. 177. The sample size would allow us to detect at least a 30% difference (from 30% to 60%) from the percentage of participants whose financial satisfaction increased in the Control group to each intervention group (two Chi-squared tests), with 80% power, a 2.5% significance level, and a 14% attrition rate.

Participants registered to attend Appointments 1 and 2 over the university's research participation portal. Appointments were scheduled Monday through Friday during business hours and took place in a small room in the Business School. Participants received £10 for each appointment they attended. The procedures and materials used at both appointments are

described below. A timeline describing participants' experience in the study is available from authors upon requests.

Procedures and Materials

At Appointment 1, a researcher met with participants individually. After receiving participants' informed consent, the researcher guided them through a six-part online guidance system at a desktop computer. Part 1 assigned participants an anonymous ID. Part 2 directed the researcher to discuss the importance of attending Appointment 2, gave participants the opportunity to reschedule, and directed participants to put Appointment 2 in their personal calendar. Part 3 asked participants about their age, gender, and ethnicity.

Part 4 asked participants to complete the Personal Need for Structure scale (Neuberg & Newsom, 1993). As discussed in the introduction, this scale is commonly used to assess people's impulsive tendencies as impulsivity may moderate the effects of financial interventions. The Personal Need for Structure scale contains 12 statements, e.g. "I enjoy having a clear and structured mode of life." Participants indicated how much they agreed with each statement using a 7-point Likert scale, where 1 indicated strongly disagree and 7 indicated strongly agree.

Part 5 asked participants to complete survey items from Money Advice Service's Financial Capabilities Survey (2015). To assess participants' financial satisfaction, the first survey contained four items. The first two items were presented in a random order: "Overall, how satisfied are you with your life nowadays?" and "How satisfied are you with your overall financial circumstances?" Then the last two items were presented in a random order: "How confident do you feel managing your money?" and "How confident do you feel making decisions about financial products and services?" Participants answered each question on an 11-point Likert scale, where 1 indicated not at all and 11 indicated completely.

To assess participants' financial behaviors, the survey included items related to their goal-setting, goal-planning, and account checking. The goal-setting item asked participants to check which (if any) of 15 financial goals they had for the next five years, e.g. "saving for holiday," along with an option to input a goal not listed, i.e. "other: [free-text]." Next, the goal-planning item asked participants how much of a plan they had to achieve each indicated goal on an 11-point scale, where 1 indicated not having any plan at all and 11 indicated having a very specific plan. Lastly, the account checking item asked participants how often they checked their balance (everyday, once a week, once a fortnight, once a month, less than once a month, never, other, or don't know).

To assess participants' subjective perceptions, participants were asked to think about their overall finances and then to indicate on a 5-point Likert scale how important four aspects were, with 1 indicating very important and 5 indicating very unimportant. The four aspects were presented in a random order: saving money for a rainy day, putting money aside for retirement, keeping track of income and expenditure, and shopping around to make money go further.

Part 6 of the online guidance system randomly allocated participants into one of the three groups in a 1:1:1 fashion: the Control, Savings-Tool, and Savings+Habit-Tools groups. Participants in the Control group received no tools. Participants in the Savings-Tool group were instructed to use the savings tool. Participants in the Savings+Habit-Tools group were instructed to use both the savings tool and habit tool. How participants were instructed to use each tool is described below.

Savings Tool. An example of a completed online savings tool appears in Figure 2. To help participants use the savings tool, the researcher gave them a paper worksheet that was a simplified version of the online savings tool. At the top of the paper worksheet was a green box in which participants wrote their monthly income. On the left-side were boxes in which

participants wrote how much they tended to spend each month on common and personal items, e.g. rent and clothing. On the right-side were boxes in which participants wrote a plan to save for a desired item; in these boxes they wrote what the goal item was, how much the goal item cost, how much they had already saved towards it, and how much they believed they could save towards it this month. For example, a participant could write the following goal plan: a holiday in Spain costing £500, with £300 already saved, and expecting to save £50 this month. The participants led the creation of these plans with the researcher making themselves available to help participants discover additional places they could save money if the participant's plans were unrealistic or if they asked for help.

After completing the worksheet, participants were given a unique user-name and password to log onto the online savings tool. Once online, participants transferred the information from their worksheet to the savings tool and added a digital picture of their goal, e.g. a picture of Spain. In addition to the information participants manually input, the savings tool also presented the sum of participants' spending in a red box labeled "total monthly outgoing" and participants' potential to save (incoming minus outgoing money) in the center of a circle diagram. The circle diagram graphically depicted participants' spending in red and potential savings in green. The researcher pointed out these automatically generated pieces of information.

Next, participants wrote a reminder in their calendar to log onto and update the savings tool at least once each week. Before participants left Appointment 1, they confirmed their intention to log onto their savings tool and to update information as needed. The researchers electronically monitored when participants logged on between appointments.

Habit Tool. An example of a completed habit tool appears in Figure 3. To help participants use the habit tool, the researcher asked participants to think about something that they buy impulsively, when they buy it, where they buy it, and what they could swap for it to

save money. For example, a participant might buy lattes, before class, at the campus cafe, that they could swap for espressos to save money. Once the researcher and participants agreed the swap was acceptable, they wrote their swap on the paper part of the habit tool. The right-most column of the paper part provided a place for participants to tally each time they perform their planned swap. The paper part was then folded to fit into a plastic card-sleeve in which participants were also asked to keep their primary debit/credit card. Before participants left Appointment 1, they confirmed their intent to keep their debit/credit card in the habit tool, to perform the indicated swap, and to bring the habit tool to Appointment 2.

After Appointment 1, the researcher emailed all participants an outlook calendar reminder for Appointment 2. Participants asked to use the savings tool were also sent a web-link to the savings tool along with their unique user-name and password, but did not receive any further reminders between appointments to use the tools. The day before all participants' Appointment 2, the researcher emailed an additional reminder to attend Appointment 2. If participants needed to reschedule, they were rescheduled for the nearest time-slot possible.

At Appointment 2, participants again completed the financial surveys about their financial satisfactions, behaviors, and subjective perceptions. These survey items were the same, with the expectation of the item at Appointment 1 that asked participants how often they checked their account balance. At Appointment 2, this item asked participants how often they checked their account balance 'since Appointment 1.' After completing these surveys, participants were asked to show the researcher their primary account's bank balances on Appointment 1 and 2's dates by logging into their bank account, after which they were reminded to log-off.

Next participants in the Savings-Tool and Savings+Habit-Tools groups were asked if they would recommend the tool(s) to other students (Yes, Maybe, or No), to write one thing they liked about the tool(s) they used, and to write one way the tool(s) could be improved.

Participants asked to use the habit tool were asked to show the researcher the number of tallies on the tool, and were allowed to keep their habit tool after their participation was complete.

Analyses

Participants' demographics and Personal Need for Structure (PNS) scores are examined overall and for each group. Then, to assess whether the interventions increased participants' financial satisfaction (objective 1), the descriptive scores (means and standard deviations) were examined across each group, for each appointments' individual and composite satisfaction items. The composite satisfaction items were created by computing the mean of each participant's individual satisfaction items at each appointment. An additional variable was then created to describe those participants whose composite financial stratification increased and those whose did not. Two chi-square tests were then computed to determine whether the percentage of participants whose financial satisfaction improved was greater in either intervention group compared to the Control group. To determine whether the differences were significant, Bonferroni's correction was used, with unadjusted p-values reported. For the remaining exploratory analyses, a 0.05 alpha level is used to assess significance and precise unadjusted p-values greater than 0.001 are reported.

In addition to the primary analysis, participants' composite satisfaction scores were also compared using a mixed-measures ANCOVA with Appointment as a within-subjects factor (Appointment 1, Appointment 2) and Group as a between-subjects factor (Control, Savings-Tool, and Savings+Habit-Tools) controlling for PNS score as a covariate. The covariate was grand mean centered (Schneider, Avivi-Reich, & Mozuraitis, 2015). Significant interactions were unpacked by comparing group means and regression slopes at each appointment, as well as the change in each groups' scores across appointments.

To assess the interventions' effects on participants' goal-planning (objective 2a), the numbers and percentage of goals for which they indicated having 'no plans,' across each group at each appointment were examined. To assess the interventions' effects on participants' account checking (objective 2b), the percentage of participants who indicated each frequency of checking across each group at each appointment were examined.

To assess whether the interventions enhanced participants' subjective perceptions (objective 3), the descriptive scores (means and standard deviations) were examined across each group, for each appointments' individual and composite attitude items. The composite attitude items were created by computing the mean of each participant's four individual attitude items at each appointment. An additional variable was then created to describe those participants whose composite attitudes increased/decreased. Two chi-square tests were then computed to determine whether the percentage of participants whose financial attitudes improved was greater in either intervention group compared to the Control group.

To assess the interventions' effects on participants' objective financial wellness (objective 4), the descriptive scores (medians and interquartile ranges) for the amount of money in each group's bank accounts at appointments 1 and 2 were examined, along with the differences between appointments, i.e. Appointment 2's balance minus Appointment 1's balance. Lastly, participants' use of and reactions to the tools (objective 5) were examined using descriptive statistics (numbers and percentages) and quotes.

Results

Characteristics of Participants

Of the 177 participants recruited, 166 completed both appointments (93.79% retention). Of the 166 participants who completed both appointments, 58 were allocated to the Control group, 55 to the Savings-Tool group, and 53 to the Savings+Habit-Tools group.

The results focus on these 166 participants. The median number of days between appointments was 28 (*Interquartile Range (IQR)* = 27 to 29). Appointment 1 lasted a median of 30 minutes (*IQR* = 21 to 37) and Appointment 2 lasted a median of 22 minutes (*IQR* = 18 to 25).

Participants' characteristics overall and for each group are described in Table 1. The median age was 21 years (*IQR* = 19 to 22). Regarding gender, 116 identified as female, 49 as male, and 1 preferred not to say. Chi-square tests revealed no difference between either intervention group and the control group, ($\chi^2(1)$'s < 1.31, p 's > 0.25). Regarding ethnicity, 80 identified as Asian, 61 as White, 16 as Black, 7 as Mixed, 1 as Arab, and 1 preferred not to say. Chi-square tests revealed no difference between either intervention group and the Control group, ($\chi^2(1)$'s < 3.20, p 's > 0.66). Lastly, participants' mean Personal Need for Structure (PNS) score was 4.52 (SD = 0.85). The mean PNS scores were similar across groups, as assessed using a one-way ANOVA with Group as a between subjects factor ($F(2, 163) = 1.04, p = 0.36, \eta^2 = 0.01$).

Objective 1: Financial Satisfaction

Each groups' mean response to the individual items and composite satisfaction scores at each appointment appear in Table 2. Recall that higher scores indicate greater financial satisfaction.

The percentage of participants whose composite satisfaction scores increased was lowest for the Control group (50%). The percentage was higher for the Savings-Tool group (60%) and highest for the Savings+Habit-Tools group (68%). The Chi-square test did not find a difference between the Control group and the Savings-Tool group, ($\chi^2(2) = 1.14, p = 0.29, \phi = 0.10$). The Chi-square test between the Control group and the Savings+Habit-Tools group trended toward but did not reach the Bonferroni adjusted alpha level set for significance, ($\chi^2(2) = 4.51, \text{unadjusted-}p = 0.03, \phi = 0.20$).

The mixed-measures ANCOVA of participants' composite satisfaction scores was then examined. The effect of Appointment and Group were significant, respectively $F(1, 162) = 27.44, p < 0.001, \eta^2 < 0.15$, and $F(2, 162) = 3.78, p = 0.03, \eta^2 = 0.05$. The effect of PNS was not significant, $F(1, 162) = 0.001, p = 0.97, \eta^2 < 0.001$. The interaction between Appointment and PNS was significant, $F(1, 162) = 4.02, p = 0.047, \eta^2 = 0.02$. As expected, the interaction between Appointment and Group was significant, $F(2, 162) = 3.73, p = 0.03, \eta^2 = 0.04$. The interactions are examined below.

To examine the interaction between Appointment and PNS, scatterplots with regression equations were produced with PNS on the horizontal axis and each appointments' composite score on the vertical axis (available from authors upon requests). While both lines are relatively flat, the slopes move in opposite directions. At Appointment 1 the unstandardized beta coefficient is -0.12 ($SE = 0.15; t(165) = -0.82, p = 0.42, 95\% \text{ Confidence Interval } [-0.42, 0.17]$). At Appointment 2 the unstandardized beta coefficient is 0.08 ($SE = 0.13; t(165) = 0.61, p = 0.55, 95\% \text{ Confidence Interval } [-0.18, 0.34]$).

Regarding the interaction between Appointment and Group, at Appointment 1 the groups did not differ, $F(2, 163) = 1.44, p = 0.24, \eta^2 = 0.02$, but at Appointment 2 the groups significantly differed, $F(2, 163) = 7.11, p = 0.001, \eta^2 = 0.08$. Both intervention groups differed significantly from the Control group, (Control to Savings-Tool: $M_{diff} = 0.88, SE = 0.26, p = 0.002, 95\% \text{ Confidence Interval } [0.27, 1.49]$; Control to Savings+Habit-Tools: $M_{diff} = 0.75, SE = 0.26, p = 0.01, 95\% \text{ Confidence Interval } [0.14, 1.36]$). The difference between the Savings-Tool and Savings+Habit-Tools groups was not significant ($M_{diff} = 0.14, SE = 0.26, p = 0.86, 95\% \text{ Confidence Interval } [-0.48, 0.76]$).

Three further tests were then conducted to explore whether any groups' composite scores increased across appointments. The Control group's scores did not, $F(1, 57) = 1.32, p$

$= 0.26, \eta^2 = 0.02; M_{diff} = 0.19, SE = 0.17, 95\% \text{ Confidence Interval } [-0.14, 0.52]$. The Savings-Tool and Savings+Habit-Tools group's scores did significantly increase, respectively $F(1,54) = 10.45, p = 0.002, \eta^2 = 0.16; M_{diff} = 0.56, SE = 0.17, 95\% \text{ Confidence Interval } [0.21, 0.91]$, and $F(1,52) = 19.96, p < 0.001, \eta^2 = 0.28; M_{diff} = 0.79, SE = 0.18, 95\% \text{ Confidence Interval } [0.44, 1.15]$.

Objective 2: Financial Behaviors

Participants' goal-planning remained largely stable across groups and appointments. At Appointment 1, participants in the Control group indicated having no plans at all about how they would achieve 60 of their 253 goals (24%), and at Appointment 2, they indicated no plans for 52 of their 294 goals (18%). At Appointment 1, participants in the Savings-Tool group indicated having no plans for 30 of their 246 goals (12%), and at Appointment 2, they indicated no plans for 35 of their 252 goals (14%). At Appointment 1, participants in the Savings+Habit-Tools group indicated having no plans for 40 of their 241 goals (17%), and at Appointment 2, they indicated no plans for 47 of their 226 goals (21%). Overall, participants had no plans at all about how they were going to achieve approximately 1 in every 5 goals.

Participants' account checking remained remarkably stable across groups and appointments. As shown in Table 3, weekly checking was the most popular frequency indicated for all groups with more than half of participants giving this response at both appointments.

Objective 3: Subjective Perceptions

Each groups' mean response to the individual items and composite attitude scores at each appointment appear in Table 4. Recall that lower scores indicate that participants feel money management is more important. The Control group's scores worsened across appointments for all items. The Saving-Tool group's scores improved for two items. The Savings+Habit-Tools group's scores improved for three items.

Notably the percentage of participants whose composite attitude scores improved across appointments is lowest for the Control group (22%). The percentage is higher for the Savings-Tool group (38%), and the Savings+Habit-Tools group (36%). While not significant, the Chi-square tests found trending significance levels for the difference between the Control group and the Savings-Tool group ($\chi^2(2) = 3.34, p = 0.07, \phi = 0.17$), and between the Control group and the Savings+Habit-Tools group ($\chi^2(2) = 2.44, p = 0.12, \phi = 0.15$).

Objective 4: Objective Financial Wellness

One-hundred participants showed the researcher their account balances. The number (and percentage) of participants who showed their balances in each group was as follows, Control-37 (64%), Savings-Tool-34 (62%), and Savings+Habit-Tools-34 (64%).

All groups experienced similar decreases in their account balances. The Control group started with a median of £721 ($IQR = £113$ to £2,317) and this decreased to £453 ($IQR = £26$ to £2,010); the median difference between appointments was -£202 ($IQR = -£647$ to -£6). The Savings-Tool group started with a median of £856 ($IQR = £276$ to £5,233) and this decreased to £551 ($IQR = £145$ to £3,377); the median difference between appointments was -£240 ($IQR = -£595$ to -£31). The Savings+Habit-Tools group started with a median of £673 ($IQR = £116$ to £2,235) and this decreased to £356 ($IQR = £62$ to £2,868); the median difference between appointments was -£221 ($IQR = -£681$ to £36).

Objective 5: Participants' Experience Using the Tools

After Appointment 1, two participants contacted the researcher to say that their login did not work properly. The researcher did not attempt to diagnose why the logins did not work (e.g. the password was incorrectly transcribed), but rather simply sent these participants a new login. Examining participants' tool use, of the 108 participants asked to use the savings tool, the objective records of logins indicate that the following numbers (and percentage) of participants logged in at least one time each week: Week 1-108 (100.0%), Week 2-61

(56.5%), Week 3-55 (50.9%) and Week 4-51 (47.2%). The median total number of logins in that four weeks was 3 ($IQR = 2$ to 5). Of the 53 participants asked to use the habit tool, 91% were able to show the researcher their habit tool tallies at Appointment 2; the median number of tallies was 4.5 ($IQR = 2.25$ to 8.75).

Of the 108 participants asked to use the savings tool, most said yes, they would recommend the tool to others (68%) or maybe (27%); few said no (6%). One of the participants who said no, clarified that they would not recommend the tool to others, because discussing financial matters with others would be “rude.” Regarding what they liked about the savings tool, many participants said they liked the diagram (41%), and that it was easy to use (34%). To improve the savings tool, participants believed automatic reminders would help them to log in more often (6%), or that the tool should be a phone app (13%).

Of the 53 participants asked to use the habit tool, most said yes (72%) they would recommend the habit tool to others, fewer said maybe (28%), and no one said no (0%). Many participants liked that the habit tool was a constant reminder to spend less (45%), and that it was easy to use (36%). One participant commented that they “Like[d] the resistance before purchase” their habit tool provided, because it stopped them from spending impulsively. To improve the habit tool, several participants (20%) thought that the tally section should be adjusted, as remembering to write the tallies was challenging. Several participants (17%) thought that the habit tool could be a phone app, and one suggested that it could be “a joint app with the savings tool.”

Discussions, Limitations, and Implications

Discussions

The current study had five objectives. Positive effects of the interventions were found for participants’ financial satisfaction (Objective 1) and trending positive effects were found for participants’ subjective perceptions (Objective 3). Neither intervention influenced

participants' financial behaviors (Objective 2) nor their objective financial wellness (Objective 4). Most participants who used the tools would recommend them to others (Objective 5). The benefits of the interventions on students' financial satisfaction are encouraging. Typically, university students are on the verge of starting their adult life and higher financial satisfaction should help them to achieve their goals. Past research suggests that financial satisfaction is related to social and consumer choices, job productivity, and marital stress (Joo & Grable, 2004). Other research finds links between people's financial satisfaction, job choices, and career outcomes (van Praag, Frijters & Ferrer-i-Carbonell, 2003; Judge, Ilies, & Dimotakis, 2010).

The present study interprets the four financial satisfaction items in the Financial Capabilities Survey as measuring a single concept. Alternatively, one could interpret these four items as measuring two concepts: one about financial satisfaction and one about financial confidence of self-efficacy. Self-efficacy is important, as people are unlikely to apply their financial knowledge without sufficient financial self-efficacy (Danes & Harberman, 2007; Szendrey & Fiala, 2018). Lown (2011) finds a strong relationship between their six-item Financial Self-Efficacy Scale and people's confidence in managing money for retirement. The means presented in Table 2 suggest that participants in the intervention groups may have experienced greater increases in items related to their confidence of self-efficacy (range 0.56 to 1.06) than in items related to their satisfaction (range 0.07 to 1.02). However, the reliability/validity of a two-item financial confidence of self-efficacy scale is questionable. Future studies may better capture financial self-efficacy by including Lown's scale (2011). Alternatively, if an intervention is tailored to a specific population, more targeted scales may be useful. For example, Nguyen's (2019) Women's Financial Self-Efficacy Scale is specifically tailored to assess women's financial self-efficacy.

While the current interventions did not increase students' objective financial wellness, one should bear in mind that our intervention period was only four weeks. A longer intervention may be necessary to find increases in students' objective financial wellness. For example, in a six-month trial in Kenya, participants asked to keep track of their weekly deposits on a savings coin, saved twice as much money as those who were not asked to do so (Akbas, Ariely, Robalino, & Weber, 2016). On the other hand, within the UK, many people view university life as a time in which students are expected to take on debt to obtain a more profitable job later in life (Esson & Ertl, 2016; Wilkins, Shams, & Huisman, 2013). Therefore, rather than increases in savings over time, the benefits of an intervention on students' objective financial wellness may appear as smaller decreases in savings over time.

A strength of the present study is its design: a randomized controlled trial. Randomized controlled trials are surprisingly uncommon in the financial literature. Indeed, most studies investigating factors that affect people's financial wellness use descriptive or correlational methods with survey or administrative data (Collins, 2017). While such methods can yield useful information, they cannot isolate the causal mechanisms needed to improve people's financial wellness. The current study is one of very few randomized controlled trials that evaluates interventions designed to increase people's financial wellness (also see: Collins, 2013).

The fact that few trials have been published is particularly striking given the number of available mobile apps claiming to support people's money management. Despite the lack of evidence supporting their benefits, nearly a third of young adults in the United States report having at least one on their mobile phones (Bankrate, 2018). A consumer advocacy group, called "Which?," reviewed five mobile apps available in the UK (2009): Money Dashboard, Moneyhub, Squirrel, Yolt, and Bud and First Direct. Like the current study's savings tool, all these apps track people's incoming and outgoing money and several allow

people to track their progress towards a goal-item. Unlike our savings tool, where people input information about their incoming and outgoing money manually, these apps can compile information from people's current accounts (and often even their credit cards) automatically.

Automating financial interventions is likely a double-edged sword. Positively, automated financial interventions can help people set default choices ahead of time to manage money, e.g. to pay bills on time or to save more money (e.g. see Bernartzi & Thaler, 2007 for a trial about automatic enrolment in retirement savings plans). Negatively, automated interventions do not sharpen people's mental capacity to make active financial choices in real-time. Largely, mobile apps are not making choices with people's money but are simply informing them about their money. Indeed, these apps can increase people's awareness of their financial situation, at least in the moment they are looking at the information presented in the apps, but the apps cannot hold people accountable after they have stopped looking. In contrast, to complete the savings tool, people had to undertake a more intense reflective process that likely embedded information about their financial situation at a deeper cognitive level (Mueller & Oppenheimer, 2014). Further, participants seeing the habit tool when they went to use their debit/credit cards likely triggered memories of this process, as they made active financial decisions in real-time (Gardner, 2015).

As many students may benefit from help while gathering information to put into their savings tool, the current intervention tools may be introduced in financial counseling sessions. Past research suggests that seeking financial advice can improve financial wellness and many universities already make financial counseling available to help students with university loans (Lim, Heckman, Letkiewicz, & Montalto, 2014; Moreland, 2018) and such counseling could be more comprehensive (Choi, et al., 2016). Britt, Canale, Fernatt, Stutz, and Tibbetts (2015) find positive effects of financial counseling on participants' subjective

attributes but little effect on their behavior. Similarly, the current tools did not change participants' financial behaviors. More targeted interventions focused on specific behaviors are likely needed to realize behavior change. The Behavior Change Wheel framework offers one theoretically and empirically informed approach for designing such interventions (Michie, van Stralen, & West, 2011).

Limitations

Limitations of the current study are now discussed. First, nearly one-third of the participants in the current study did not show their bank balances. While it was not a stated goal of the study to understand student debt, this level of attrition could raise questions about the generality of our findings, if particular subsets of participants were less likely to disclose and these subsets were more heavily represented in particular groups. As attrition was similar across groups, we suspect that general factors are a better explanation, and it is unlikely that these general factors undermined our group comparisons. For example, the taboo nature of financial disclosure itself may have influenced participants in all groups (Alsemgeest, 2016).

A second limitation is the short duration between Appointments 1 and 2. A longer duration was not used to ensure higher participant retention. The duration of an academic term is only a few months and asking students to attend follow-up appointments outside term-time would have increased attrition. Future studies may find a better means to retain participants over longer durations. However, some benefits of the tools likely need to be apparent within a short duration, as people often stop using interventions that take longer to show benefits. For example, 40% of people who start using health apps stop using them quickly, simply because they lose interest (Krebs & Duncan, 2015).

A third limitation is that we did not collect demographic information to understand differences between three relevant types of participants, including students eligible for government tuition and maintenance loans, students eligible for government tuition loans but

not maintenance loans, and students not eligible for either type of loan (Crown Copyright, n.d). The factors that affect each type of students' financial wellness likely differ. As many universities already make hardship funds available to international students (a group often not eligible for either loan type) whose financial situation deteriorates, this may be an interesting and feasible population to target in future trials (Hyams-Ssekasi, Mushibwe, & Caldwell, 2014).

A final limitation to note is the fact that the interventions take a broad, multi-faceted approach to change behavior. Such multi-faceted approaches have been criticized in healthcare for unnecessarily increasing intervention costs (Squires, Sullivan, Eccles, Worswick, & Grimshaw, 2014). This should not be a large concern for the present interventions. The present interventions require a one-off cost to set-up an internet tool or to provide a paper card to put in students' wallets near their debit/credit card. Additional costs include the counselor's time, but that cost is often already present at universities.

The need for a multi-faceted intervention may be unavoidable. Harvey and Kitson (2015) argue that interventions meant to influence a greater range of people with more complex problems, often require multi-faceted approaches for any positive effects to appear. Put another way, an intervention designed to affect a singular COM-B component may prove inadequate to produce either (1) population-level benefits— because different individuals experience different barriers or (2) individual-level benefits— because many individuals experience multiple barriers that need to be simultaneously overcome. Comparing interventions designed to affect each COM-B component, in isolation and combination, would be a welcomed addition to the literature but would likely require a much larger sample-size than the current study could feasibly obtain. A future study with a similar sample-size may improve our study design by measuring the effects of a multi-component

intervention on each component of the COM-B model to better understand what COM-B factors are most influenced.

Implications

The savings tool and habit tools described in the current report can be readily taken up to improve clients' financial wellness. Financial counselors, advisors, and educators can use these tools to help structure conversations during counselling/educational sessions to build clients' self-efficacy by prompting them to set personalized SMART-goals to improve their own financial wellness. In addition, by asking clients to continue to use their savings and habit tools at home, the tools may serve as a tangible reminder of these conversations and their progress towards their personalized SMART-goals. The most relevant clients are university students, but we suspect that these tools can be used to help a broader population of people seeking financial support. We encourage counselors, advisors and educators to adapt these tools as they see fit, to evaluate their tools' efficacy, and to share their findings.

In conclusion, the current study evaluated interventions designed to improve the financial wellness of university students in England. The interventions included two tools, the savings tool and the habit tool. Students asked to use the tools experienced greater benefits to their financial satisfaction than those who were not asked to use either tool. Given the benefits of the tools on student satisfaction and students' positive endorsements, future studies should explore the effectiveness of the tools in broader student populations.

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Table 1.

Participant Characteristics, with percentages by group.

		All	Control Group	Savings-Tool Group	Savings+Habit-Tools Group
Number*	Consented	177	60	59	58
	Retained (%)	166 (93.8%)	58 (96.7%)	55 (93.2%)	53 (91.4%)
Age	Median (years)	21	20	21	21
	25 th to 75 th percentile	19 to 22	19 to 22	19 to 22	19.5 to 22
Gender**	Female (%)	116 (69.9%)	38 (65.5%)	38 (69.1%)	40 (75.5%)
	Male (%)	49 (29.5%)	20 (34.5%)	16 (29.1%)	13 (24.5%)
	Prefer not to say (%)	1 (0.01%)	0 (0.0%)	1 (0.02%)	0 (0.0%)
Ethnicity**	Asian (%)	80 (48.2%)	26 (44.8%)	29 (52.7%)	25 (47.2%)
	White (%)	61 (36.7%)	22 (37.9%)	21 (38.2%)	18 (34.0%)
	Black (%)	16 (9.6%)	7 (12.1%)	4 (7.3%)	5 (9.4%)
	Mixed (%)	7 (4.2%)	2 (3.4%)	1 (0.02%)	4 (7.5%)
	Arab (%)	1 (0.01%)	0 (0.0%)	0 (0.0%)	1 (0.02%)
	Prefer not to say (%)	1 (0.01%)	1 (0.02%)	0 (0.0%)	0 (0.0%)
Personal Need for Structure (SD)		4.52 (0.85)	4.62 (0.90)	4.55 (0.79)	4.39 (0.83)

*for the % retained the denominator is the number consenting for each group and

**for % gender and % ethnicity the denominator is the number retained for each group.

Table 2.

Participant responses to the financial satisfaction items, by group, across appointments.

Group	Item	Appointment 1 Mean (<i>Sd</i>)	Appointment 2 Mean (<i>Sd</i>)	Percentage improved (# improved/ # total)
Control	satisfied nowadays	7.57 (2.23)	7.57 (1.83)	
	satisfied with financial circumstances	6.69 (2.54)	6.98 (2.20)	
	confident managing money	7.41 (2.42)	7.57 (1.97)	
	confident making decisions about financial products and services	6.55 (2.48)	6.97 (2.00)	
	composite score	7.08 (1.77)	7.27 (1.63)	50% (29/58)
Saving-Tool	satisfied nowadays	8.15 (1.98)	8.22 (1.47)	
	satisfied with financial circumstances	7.53 (2.12)	8.02 (1.63)	
	confident managing money	7.69 (2.15)	8.27 (1.41)	
	confident making decisions about financial products and services	7.00 (2.30)	8.11 (1.55)	
	composite score	7.59 (1.46)	8.15 (1.00)	60% (33/55)
Savings+ Habit Tools	satisfied nowadays	8.26 (1.71)	8.47 (1.41)	
	satisfied with financial circumstances	6.83 (2.46)	7.85 (1.74)	
	confident managing money	7.15 (2.27)	8.04 (1.82)	
	confident making decisions about financial products and services	6.66 (2.50)	7.72 (1.98)	
	composite score	7.23 (1.64)	8.02 (1.37)	68% (37/53)

Table 3.

Participant account checking by group across appointments.

		Appointment 1 Number (%)	Appointment 2 Number (%)
Control	Every day	13 (22.4%)	13 (22.4%)
	At least once a week, but not every day	36 (62.1%)	37 (63.8%)
	At least once a fortnight, but not once a week	5 (8.6%)	8 (13.8%)
	At least once a month, but not once a fortnight	4 (6.9%)	
Savings- Tool	Every day	6 (10.9)	7 (12.7%)
	At least once a week, but not every day	32 (58.2)	34 (61.8%)
	At least once a fortnight, but not once a week	11 (20.0%)	10 (18.2%)
	At least once a month, but not once a fortnight	5 (9.1%)	3 (5.5%)
	Other	1 (1.8%)	1 (1.8%)
Savings + Habit-Tools	Every day	9 (17.0%)	9 (17.0%)
	At least once a week, but not every day	32 (60.4%)	34 (64.2%)
	At least once a fortnight, but not once a week	5 (9.4%)	7 (13.2%)
	At least once a month, but not once a fortnight	4 (7.5%)	2 (3.8%)
	Less than once a month	2 (3.8%)	1 (1.9%)
	Never	1 (1.9%)	

Table 4.

Participant responses to the subjective perception items, by group, across appointments.

Group	Item	Appointment 1 Mean (Sd)	Appointment 2 Mean (Sd)	Percentage improved (# improved/ # total)
Control	saving for a rainy day	1.76 (1.11)	1.91 (1.16)	
	money for retirement	2.22 (1.42)	2.47 (1.25)	
	keeping track	1.26 (0.52)	1.38 (0.59)	
	shopping around	2.21 (1.07)	2.36 (1.07)	
	composite score	1.86 (0.61)	2.03 (0.56)	22% (13/58)
Saving-Tool	saving for a rainy day	1.95 (1.24)	1.85 (1.06)	
	money for retirement	2.31 (1.10)	2.40 (1.15)	
	keeping track	1.45 (0.66)	1.49 (0.72)	
	shopping around	2.07 (1.03)	1.91 (0.91)	
	composite score	1.95 (0.62)	1.91 (0.60)	38% (21/55)
Savings+ Habit-Tools	saving for a rainy day	2.15 (1.29)	2.00 (1.27)	
	money for retirement	2.28 (1.25)	2.38 (1.32)	
	keeping track	1.36 (0.68)	1.32 (0.51)	
	shopping around	2.25 (1.04)	2.13 (1.11)	
	composite score	2.01 (0.59)	1.96 (0.42)	36% (19/53)

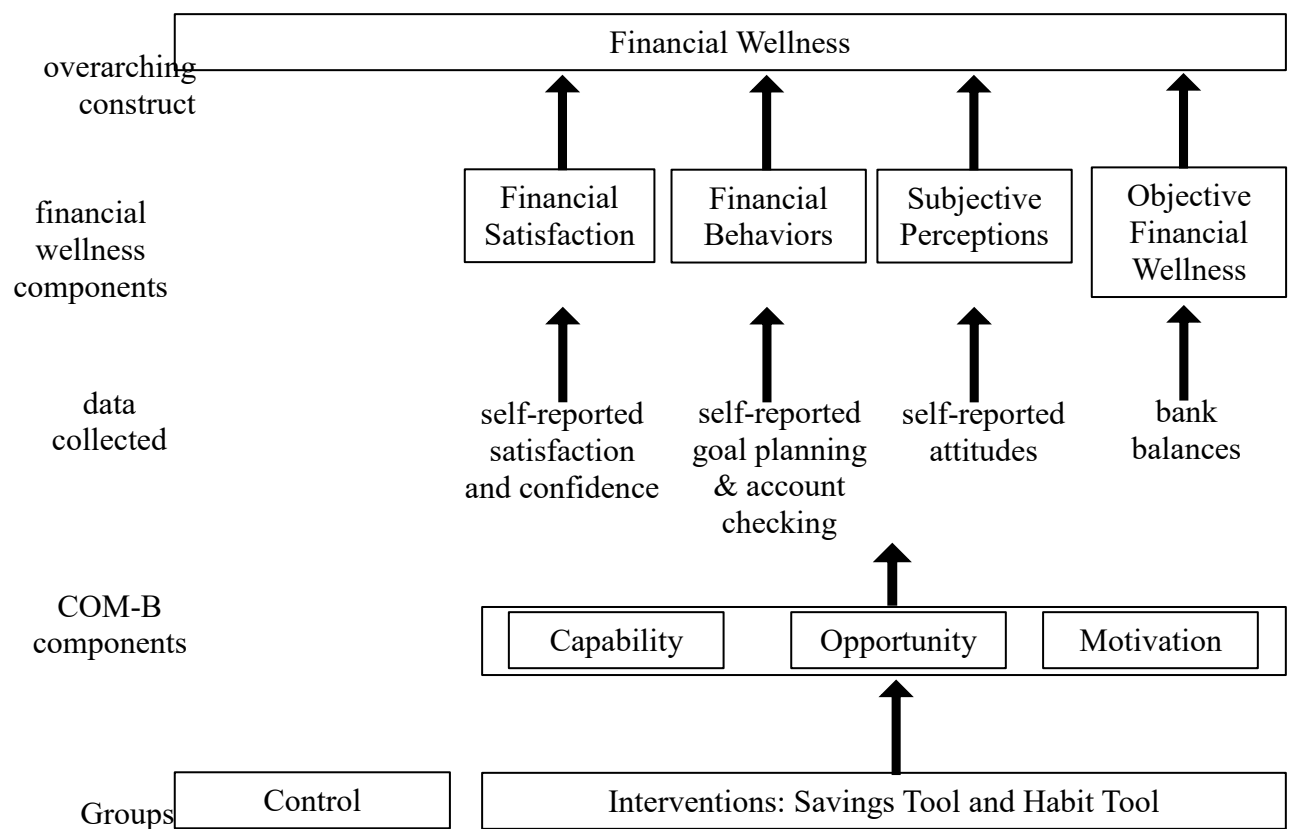


Figure 1. A redrawing of Joo's, 2008 Financial Wellness Taxonomy along with the data collected to measure each component and the potential effects of the intervention.

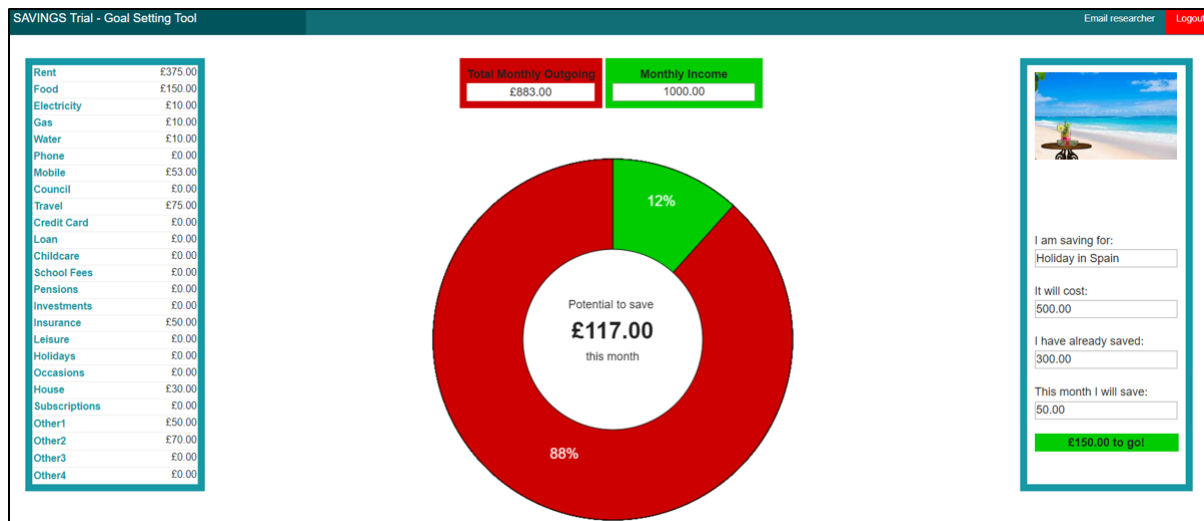


Figure 2. Savings Tool.

What	I can save here...	When	Where
Venti Vanilla Spice Latte £3.75		Before Class	Campus cafe

What	So I can spend here...	Give yourself a tick
Double Espresso Shot £1.90		

Figure 3. Habit Tool.